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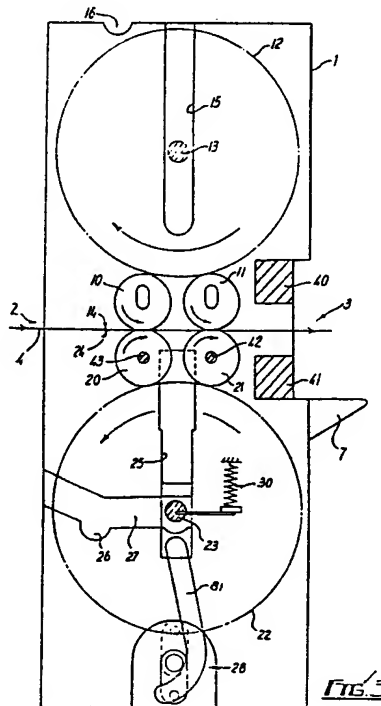
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**(54) Apparatus for treating sheet articles.**

57) Apparatus for treating sheet articles (4), to remove in an automatic and efficient manner from the surfaces (14, 24) of sheet articles (4), such as photographic films, deposits and other impurities marring the optical properties. The apparatus has two pairs of transfer rollers (10, 11 and 20, 21) in contact with the respective surfaces (14, 24) of the said sheet article (4) and cleaning rollers (12, 22) in contact with a respective pair of transfer rollers (10, 11 and 20, 21). The tackiness of the surfaces of the cleaning rollers (12, 22) is greater than the tackiness of the surfaces of the transfer rollers (10, 11, 20, 21) such that impurities are lifted from the surfaces of the article (4) and transferred to rolls of adhesive film wound round the cleaning rollers (12, 22). A release mechanism (28) is provided to remove the rollers (12, 22) for renewal of the film.



"Apparatus For Treating Sheet Articles"

This invention relates to apparatus for treating sheet  
articles to remove dust, dust particles and similar  
5 impurities from the surfaces of the sheet articles.

Background of the Invention

10 The invention has particular application in the cleaning of  
photographic elements or photo-tools in order to remove  
impurities on the surfaces of such elements, these  
impurities adversely affecting the optical properties of the  
element resulting in a defective end product.

15 It is an object of the present invention to provide  
apparatus for removing impurities from the surface of a  
sheet article in an automatic and efficient manner.

Brief Summary of the Invention

20 According to the present invention there is provided  
apparatus for treating sheet articles to remove deposits  
from the surface of the sheet article, the apparatus  
comprising at least one transfer roller contacting the  
25 surface of the sheet article to be treated, and a cleaning

roller in rolling contact with said transfer roller, the tackiness of the surface of the cleaning roller being greater than the tackiness of the surface of said transfer roller.

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Preferably, two pairs of transfer rollers are provided, each pair contacting a respective surface of the sheet article, the pair of transfer rollers arranged on one side of the sheet being contacted by a first cleaning roller and the  
10 pair of transfer rollers arranged on the other side of the sheet being contacted by a second cleaning roller.

Preferably also, each transfer roller is of silicone or alternatively is provided with a silicone coating.

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Preferably also, each cleaning roller is provided with a reverse wound roll of adhesive coated tacky film.

Preferably also, there is a release mechanism provided with  
20 crank means, for moving the cleaning rollers into and out of contact with their associated transfer rollers and to aid in the removal of the cleaning rollers.

#### Brief Description of the Drawings

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Embodiments of the present invention will now be described, by way of example, with reference to the accompanying drawings, in which:-

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Fig. 1 is a perspective view of the exterior of apparatus for treating sheet articles made in accordance with the invention;

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Fig. 2 is a side view of the apparatus of Fig. 1;

Fig. 3 is a cross-sectional view of one embodiment of apparatus for treating sheet articles made in accordance with the present invention; and  
5 Fig. 4 is a part-schematic view of the interior of an end plate of a modified embodiment of apparatus for treating sheet articles made in accordance with the present invention.

10 Detailed Description of Embodiments of the Invention

Referring to Figs. 1 to 3 of the drawings, there is shown apparatus for treating sheet articles. The apparatus  
15 includes a casing 1 comprising two end plates 5 and a central cover 6 which has an input station 2 and an output station 3, the former for guiding a sheet article 4 to be treated into the casing 1 and the latter being provided with a lip 7 for guiding exit of the sheet article 4 from the  
20 apparatus.

Mounted within the casing 1 there are two pairs of transfer rollers 10, 11 and 20, 21. The sheet article 4 to be treated passes between pairs of rollers 10, 11 and 20, 21  
25 such that respective surfaces of the sheet article are contacted by a respective pair of transfer rollers. Thus, the upper surface 14 of the sheet 4 is contacted by rollers 10 and 11 whilst the lower surface 24 of the sheet 4 is contacted by rollers 20 and 21.

30 Each transfer roller 10, 11, 20, 21 is made of silicone, or alternatively the surface of each transfer roller is coated with silicone. The tackiness of the silicone is sufficient to lift impurities from the surfaces 14, 24 of the sheet  
35 article 4 without causing damage to the article surface and

without leaving a deposit of silicone on the article surface.

To prevent impurities which have been removed from the surfaces of the article 4 from being redeposited onto the article 4, cleaning rollers 12 and 22 are provided. The cleaning rollers 12 and 22 are constituted by respective rolls of reverse wound film having an outwardly facing coating of a natural rubber based adhesive, the tackiness of which is greater than the tackiness of the silicone of the transfer rollers. The cleaning roller 12 is in rolling contact with transfer rollers 10 and 11 and removes any impurities from the surfaces of these rollers whilst cleaning roller 22 is in rolling contact with transfer rollers 20 and 21 and removes any impurities from the surfaces of these rollers.

The lower pair of transfer rollers 20, 21 are driven by an electric motor (not shown) which is activated at a control panel 9 by the user and transmits rotation to rollers 20, 21 through spindles 43 and 42 respectively. The rotation is transmitted from the rollers 20, 21 to their associated cleaning roller 22 and, through the sheet article 4, to the upper transfer rollers 10, 11 and their associated cleaning roller 12.

The cleaning roller 12 is mounted on a spindle 13 located in channel 15 in the casing 1. The roller 12 is held by gravity in contact with the transfer rollers 10 and 11 and, to facilitate renewing of the exposed tacky surface, the casing 1 is provided with a locating cut-out 16 into which the spindle 13 may be positioned whilst the used length of tacky film is removed.

The cleaning roller 22 is held in rolling contact with

transfer rollers 20, 21 by a spring mechanism shown schematically at 30 which acts on a spindle 23 on which the roller 22 is mounted, the spindle 23 being located in channel 25 in the casing 1. A release mechanism 28, which is  
5 operated by a lever 8 through connecting arm 81, is provided for the roller 22 to permit the roller 22 to be moved away from transfer rollers 20, 21 until spindle 23 is aligned with a guiding channel 27 along which the roller 22 may be moved into notch 26 in order that the exposed tacky surface  
10 of the roller 22 may be renewed. The channel 27 and notch 26 are formed on the interior of each end plate 5.

As the treated sheet article 4 approaches the output station 3, the sheet article 4 passes through an anti-static unit  
15 40, 41 activated from control panel 9. This unit 40, 41 dissipates the build-up of electrostatic charge which results from passage of the sheet article 4 through the apparatus.

20 Referring now to Fig. 4 of the drawings, there is shown an modified embodiment of the apparatus for treating sheet articles. Spring 30, which is positioned in channel 25, is attached at 39 to the end plate 5 and to an end 34 of a block 33 which is movable within channel 25. The spindle 23  
25 of the lower cleaning roller 22 rests on a curved lip 36 of block 33 and the spindle 13 of the upper cleaning roller 12 rests on a curved lip 17 of a block 35 positioned within and movable along channel 15. Blocks 35 and 33 are connected through the release mechanism 28 activated by the lever 8 on  
30 the exterior of one end plate 5. The release mechanism 28 includes a wheel 31 to which are attached, at points 37 and 38 respectively, one end of a U-shaped connecting arm 29 and one end of a connecting arm 44 equivalent to the arm 81 of Fig. 3. A similar release mechanism is provided on of each  
35 end plate 5 and the two mechanism are connected by a shaft

32. When the lever 8 is in its operative position, point 37 of the U-shaped connecting arm 29 is at the base of the wheel 31 and point 38 of the connecting arm 44 is at the top of the wheel 31, such that the cleaning rollers 12, 22 are  
5 brought into contact with transfer rollers 10, 11 and 20, 21, block 35 and its associated cleaning roller 12 rests firmly at the base of channel 15, and the block 33 is urged upwardly against the action of spring 30, such that the cleaning roller 22 contacts transfer rollers 20, 21.

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When the lever 8 is moved to its release position, the mechanism is reversed. The cleaning rollers 12, 22 are brought out of contact with their respective transfer rollers 10, 11 and 20, 21, the upper cleaning roller 12 being  
15 moved up channel 15 and the lower cleaning roller 22 to a position aligned with channel 27.

Thus, there has been provided apparatus for removing impurities from sheet articles in an automatic and efficient  
20 manner whilst minimising damage to the article itself. The hardness of the silicone of the transfer rollers may be modified to suit the article being cleaned especially since the articles may greatly vary to include laminates, photographic films, glass or inner layers.

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Modifications and improvements may be incorporated without departing from the scope of the invention.

CLAIMS

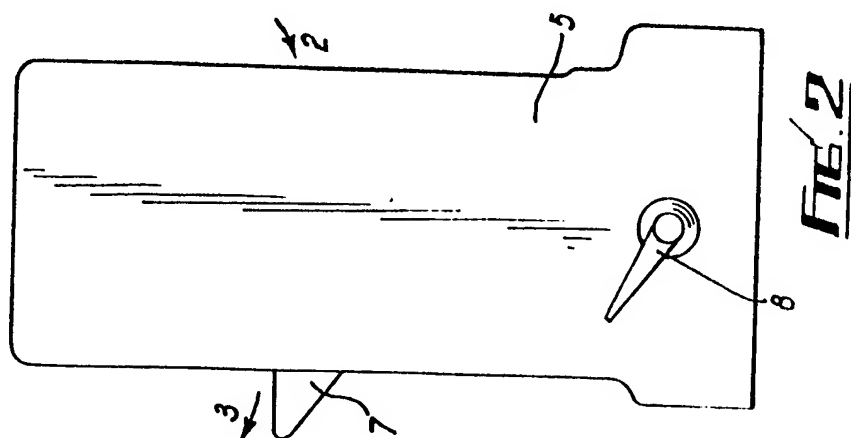
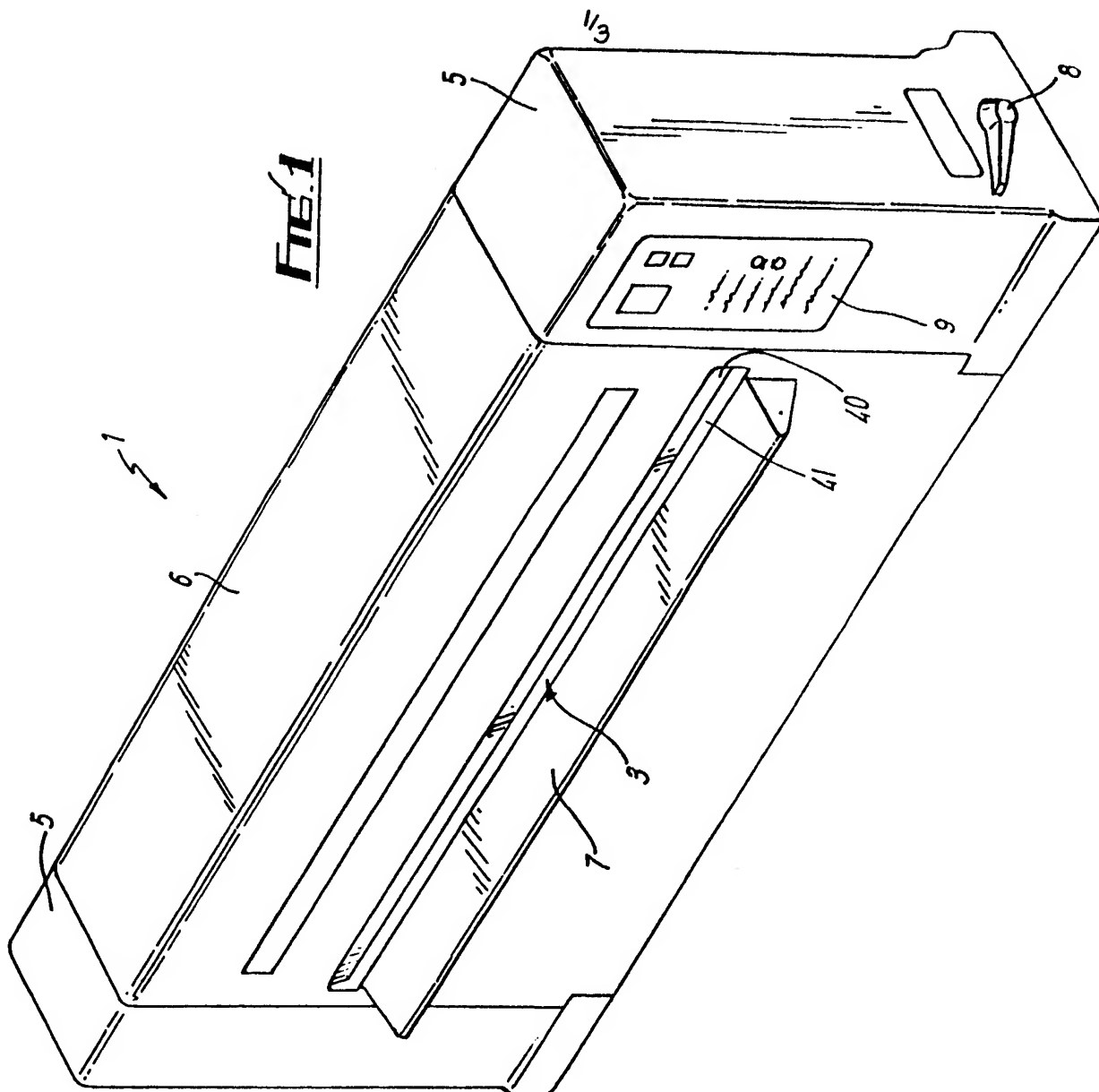
1. Apparatus for treating sheet articles to remove deposits from the surface of the sheet article, the apparatus  
5 comprising at least one transfer roller (10, 11, 20, 21) contacting the surface (14, 24) of the sheet article (4) to be treated, and a cleaning roller (12, 22) in rolling contact with said transfer rollers (10, 11, 20, 21), the tackiness of the surface of the cleaning roller (12, 22)  
10 being greater than the tackiness of the surface of said transfer rollers (10, 11, 20, 21).
2. Apparatus as claimed in Claim 1, wherein two transfer rollers (10, 11, 20, 21) are provided one for each surface  
15 (14, 24) of the sheet article (4), the transfer roller (10, 11) on one side (14) being contacted by a first cleaning roller (12) and the transfer roller (20, 21) on the other side (24) of the sheet (4) contacted by a second cleaning roller (22).
- 20 3. Apparatus as claimed in either Claim 1 or 2, wherein two pairs of transfer rollers (10, 11 and 20, 21) are provided, the rollers of each pair (10, 11 and 20, 21) contacting a respective surface (14, 24) of each article (4).
- 25 4. Apparatus as claimed in any preceding claim, wherein each transfer roller (10, 11, 20, 21) is of silicone.
5. Apparatus as claimed in any preceding claim, wherein  
30 each transfer roller (10, 11, 20, 21) is provided with a silicone coating.
6. Apparatus as claimed in any preceding claim, wherein  
35 each cleaning roller (12, 22) is provided with a reverse wound roll of adhesive coated tacky film.

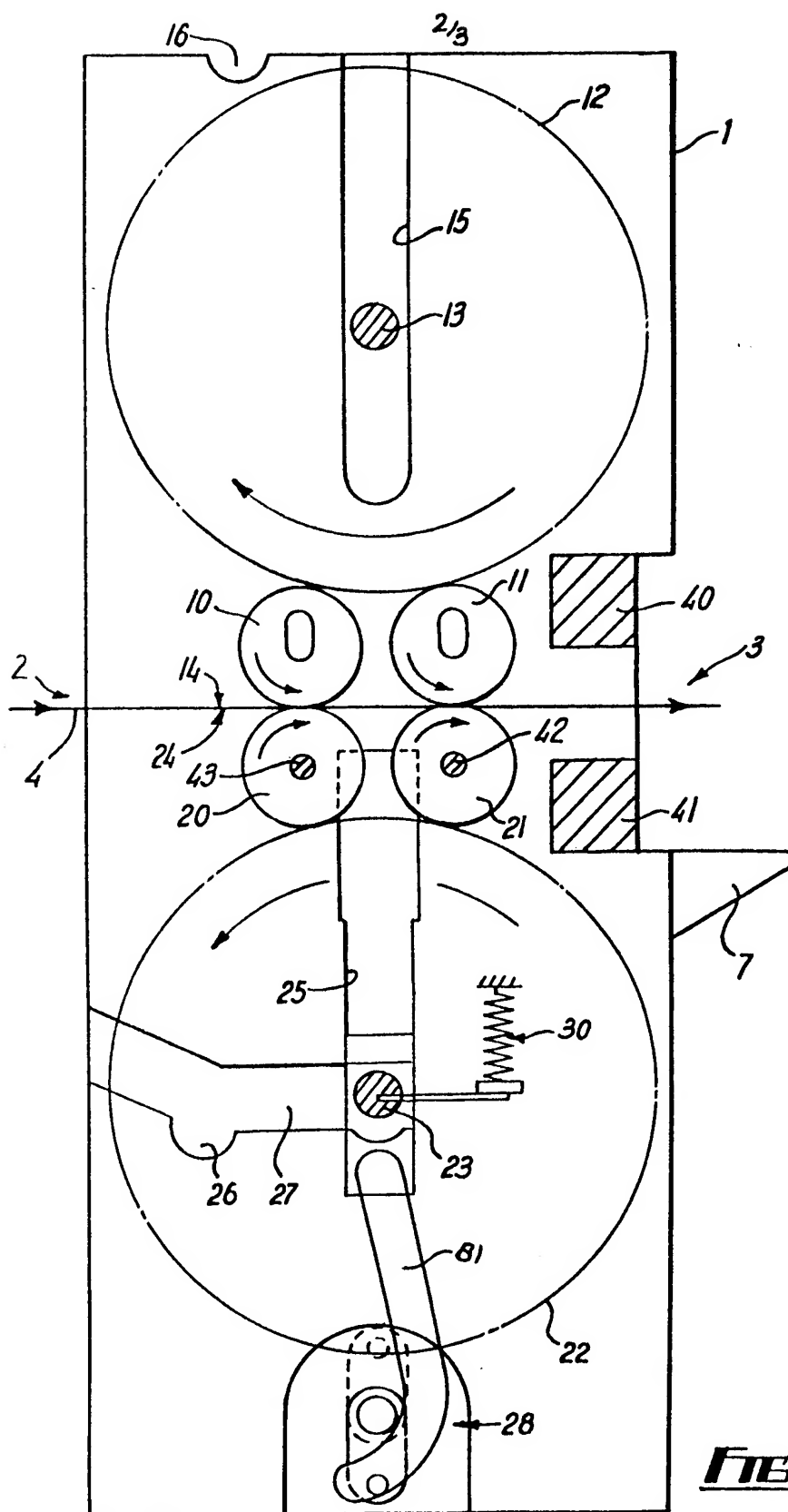


7. Apparatus as claimed in any preceding claim, wherein a release mechanism (28) is provided having crank means (8) for moving said cleaning roller (12, 22) into and out of contact with said transfer rollers (10, 11, 20, 21).

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8. Apparatus as claimed in any preceding claim, wherein the sheet article (4) passes through an anti-static mechanism (40, 41) before passing out of the apparatus.





**Fig. 3**

